SE comp Sem-4 10/06/2014

TCS

QP Code :**NP-19836**

(3 Hours) **[Total Marks : 80**

N.B. : (1) Questions No.**1** is **compulsory**.
(2) Attempt any **three** questions out of remaining **five** questions.
(3) Assumptions made should be **clearly** stated.
(4) **Figures** to the **right** indicate **full** marks
(5) Assume **suitable** data wherever **required** but **justify** the same.

1. (a) Differentiate between NFA and DFA. **5**
(b) Explain CNF and GNF with example. **5**
(c) State and prove closure properties of Context Free Languages. **5**
(d) Give Applications of Regular Expression and Finite Automata. **5**

2. (a) Construct an NFA with epsilon transition for following RE. **5**
$(00 + 11)^*(10)^*$
(b) Give formal definition of Regular expression. Give R.E. for following :— **5**
(i) Set of all strings over {1, 0} that end with 1 and has no substring 00.
(ii) Set of all strings over {1, 0} with even number of 1's followed by odd number of 0's.
(c) Compare and Contrast Moore and Mealy Machine. Construct Moore Machine to find out the residue-modulo-3 for binary numbers. **10**

3. (a) Consider the following grammar :— **10**
$S \rightarrow i\ C\ t\ S \mid i\ C\ t\ S\ e\ S \mid a$
$C \rightarrow b$
For the String 'ibtibtaea' find the following :
(i) Leftmost derivation
(ii) Rightmost derivation
(iii) Parse Tree
(iv) Check if the above grammar is Ambiguous
(b) Design PDA that checks for well- formed parentheses. **10**

4. (a) Design a TM that recognizes palindrome strings where $\Sigma = \{0, 1\}$ **10**
(b) Construct NFA that accepts a set of all strings over {a, b} ending with "abb" Convert this NFA to Equivalent DFA. **10**

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5. (a) Convert the following Grammar to CNF form :— 10

$S \rightarrow ABA$

$A \rightarrow aA \mid bA \mid \in$

$B \rightarrow bB \mid aA \mid \in$

(b) Give and explain the formal statement of Pumping Lemma for regular languages and use it to prove that the following language is not regular : 10

$L = \{ a^n b^n \mid n >= 1\}$

6. Write short note on :— 20

(a) Chomsky Hierarchy of Grammar

(b) Variants of Turing Machine

(c) Rice's Theorem

(d) Recursive and Recursively enumerable languages.

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